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FILED IN THE
UNITED STATES DISTRICT COURT
DISTRICT OF HAWAII

MAR 21 2008
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SUE BEITIA, CLERK

IN THE UNITED STATES DISTRICT COURT

DISTRICT OF HAWAII

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LUIS SANCHO, et al.,

Plaintiffs

vs.

US DEPARTMENT OF ENERGY, et al.,

Defendants

Civil No. **C.V.08 00136** **HG KSC**

**AFFIDAVIT OF MARK LEGGETT
IN SUPPORT OF TRO AND
PRELIMINARY INJUNCTION**

AFFIDAVIT OF MARK LEGGETT IN SUPPORT OF
TRO AND PRELIMINARY INJUNCTION

I, Mark Leggett, affirm state and declare, under penalty of perjury of the laws of the State of Hawaii, as follows:

1. I work in risk assessment and mitigation, using applied science, at the Key Centre for Ethics, Law, Justice and Governance, *Griffith University*, Brisbane,

Queensland, Australia where I hold an adjunct professorship. In 2006 I was invited to apply for the position of Deputy Director (Global Catastrophic Risks) at the Future of Humanity Institute at Oxford University, United Kingdom. My work in transport safety risk mitigation using police enforcement has been rated above all other methods in a major European Commission commissioned worldwide scan of such methods, and been the subject of state and national awards in Australia. I started my career in pure science, in the biological sciences, and my research has been published in the *Nature* science journal. A modified version of the risk mitigation approach I developed above is used in my work at the Key Centre on global risks.

2. An initial paper from my work entitled "An Indicative Costed Plan for the Mitigation of Global Risks" was published in 2006 in the journal *Futures* (Vol. 38, pp. 778-809). This paper assembled information on risks which authoritative prior refereed studies had considered plausible global risks, and assessed the feasibility of action against them.

3. This affidavit is about one of these potential catastrophic risks, that from the Large Hadron Collider [LHC] being built by CERN near Geneva. It concerns issues with the risk assessment process, especially concerning ethics. Other issues, such as with the physics of the risk, are dealt with in other affidavits.

4. CERN operates within the European Union (EU). The European Union should have been well served in managing the LHC risk situation. In 2000 the European Council, highly commendably, adopted, in the form of a Resolution, the *Precautionary Principle*. If the *Precautionary Principle* had been adopted for the LHC

potential risk, it can be argued that more than the current CERN LSAG study, still overdue, would have been done.

5. What I will outline in the following paragraphs and in the attachment uses published authoritative frameworks for ethical risk assessment to assess the "risk assessment" so far conducted for the LHC and make a case that it has been conducted in a way which raises major ethical questions.

6. The case is that the prime, foundational, risk concerns ethics – if a method has faults, one cannot have confidence in the results of the method. - specifically (i) that the question of whether catastrophic risks might be associated with the LHC was given standing only at a very late stage of LHC development and (ii) then ,was assessed *only by the protagonists for the collider project*. It is noted that the needed, appropriate, third-party arm's-length investigation – thus far missing – of a possible false alarm and the resultant settling of the issue, would be vastly less intrusive than the situation where, if this is a genuine risk, it is allowed past us without redress.

7. It is quite possible that without any change in current arrangements, the LHC might operate without harm. But in fully formal terms, because of the lapses in the safety assessment process, we will have won a gamble, not managed a risk. This view, that the current state of the risk assessment situation is inappropriate, is supported by an eminent Australian professional ethicist, Professor W. Hall, currently a professor in the School of Population Health, *University of Queensland*, and formerly (2001-2005) Director of the Office of Public Policy and Ethics at the *Institute for Molecular Bioscience* at the *University of Queensland*. Professor Hall wrote:

"Thanks for seeking my advice on an interesting ethical and public policy issue that I had not previously heard about. I am not a physicist and so find it hard to make judgments about the seriousness of the risk posed by the LHC but I think that Mark Leggett makes a good *prima facie* case that the risk assessment process used for the LHC has not met the EU's own criteria." (Prof. Hall refers here to inconsistencies between the CERN LHC process and the EC *Precautionary Principle* resolution, *infra*.)

8. I illustrate the inconsistencies that Professor Hall found convincing by including them here. They are illustrated by selecting excerpts from the official European Council resolution on the *Precautionary Principle* and from time to time appending evidence annotating the analogous component of the CERN process by way of bracketed [inserts]:

"This resolution was adopted at the European Council Meeting in Nice on 7-9 December 2000, as Annex III of the Presidency Conclusions. This submission is a follow-up to the Communication of the European Commission on the *Precautionary Principle*, adopted 2 February 2000:

EUROPEAN COUNCIL RESOLUTION ON THE PRECAUTIONARY PRINCIPLE

A. Whereas the principles laid down in the EC Treaty provide that Community action must aim at a high level of protection of human health, consumers and the environment and that these objectives must be integrated into the European Union's policies and action;

...

H. Whereas the preamble to the World Trade Organization (WTO) Agreement sets out general objectives which include sustainable development and environmental protection and conservation; whereas Article XX of the GATT and Article XIV of the GATS contain general exceptions, while Article 5(7) of the Agreement on the Application of Sanitary and Phyto-sanitary Measures (SPS) lays down rules on the procedure to be followed in the event of risk and insufficient scientific evidence; whereas the Agreement on Technical Barriers to Trade (TBT) allows account to be taken of the risks that failure to apply measures might pose for human health or safety, animal or plant life or the environment;

...

K. Realizing that public authorities have a responsibility to ensure a high level of protection of human health and the environment and have to address increased public concern regarding the risks to which the public are potentially exposed;

...

Welcomes the Commission's initiative in presenting a communication on the Precautionary Principle, the broad lines of which the Council endorses;

...

Considers that the Precautionary Principle applies to the policies and action of the Community and its Member States and concerns action by public authorities both at the level of the Community institutions and at that of Member States; that such authorities should endeavor to have that principle fully recognized by the relevant international fora;

Considers that use should be made of the Precautionary Principle where the possibility of harmful effects on health or the environment has been identified and preliminary scientific evaluation, based on the available data, proves inconclusive for assessing the level of risk;

Considers that the scientific assessment of the risk must proceed logically in an effort to achieve hazard identification, hazard characterization, appraisal of exposure and risk characterization, with reference to procedures recognized at Community level and internationally, and that, owing to insufficient data and the nature or urgency of the risk, it may not always be possible to complete every stage systematically;

Considers that, in order to carry out the risk assessment, public authorities must have suitable research facilities and rely in particular on scientific committees and on relevant national and international scientific work; that the public authorities are responsible for organizing the risk assessment, which must be carried out in a multidisciplinary [note: *LSAG involves only physicists*], independent [note: *LSAG was created by, and reports to, CERN management*] and transparent [note: *LSAG members and its terms of reference and method are not identified*] manner and ensure that all views are heard;

Considers that an assessment of risk must also report any minority opinions. It must be possible to express such opinions and bring them to

the knowledge of the parties involved, in particular if they draw attention to scientific uncertainty [note: *CERN's previous style has been not to respect and specify, but to pooh-pooh, uncertainty*];

...

Considers that civil society must be involved [note: *LSAG contains no members of civil society*] and special attention must be paid to consulting all interested parties as early as possible [note: *It is clear that not all interested parties have been consulted. In Dr. Wagner's words, quoted from an email to me: "I have requested of CERN that their 'group of experts' referenced in the letter contact our group of experts (physicists and engineers), but we have not heard anything back as of yet."*];

...

Stresses that the measures adopted presuppose examination of the benefits and costs of action and inaction. This examination must take account of social and environmental costs and of the public acceptability of the different options possible, and include, where feasible, an economic analysis, it being understood that requirements linked to the protection of public health, including the effects of the environment on public health, must be given priority;

...

Calls on the Member States and the Commission to:

- have this Resolution as widely disseminated as possible [note: The above suggests CERN is either not aware of the Resolution, or has not acted on it sufficiently]."

[underlining added for emphasis]

9. I consider his comparison relevant because a separate document, the European Commission's Science and Society Action Plan, states, in its *Risk Governance* section:

"The Commission has also set out its approach to the use of the *Precautionary Principle*, suggesting guidelines for risk management when faced with scientific uncertainty, and stating general principles always to be applied in risk management."

The Science and Society Action Plan also refers to:

"...the use of scientific knowledge complying with common ethical rules."

Further, on page 7 the document states:

"Industrial hazards and ethical issues are widely highlighted in the media, raising questions and reinforcing the public's desire for progress to be more closely monitored."

Again, the information shows that the LHC has arrived this far with its catastrophic safety risks monitored only by its protagonists, contrary to the above requirements.

10. On page 17, Section 2.1 involving civil society, the European Commission's Science and Society Action Plan states:

"The Commission is committed to improving transparency and consultation between administrations and civil society, as outlined in the White Paper on European Governance. To this end, it will adopt a set of minimum standards to be followed by its departments in all policy areas, including research. If citizens and civil society are to become partners in the debate on science, technology and innovation in general and on the creation of the European Research Area in particular, it is not enough to simply keep them informed. They must also be given the opportunity to express their views in the appropriate bodies." [underlining added for emphasis]

This required involvement has not been offered by CERN.

11. In Section 3, *Responsible Science at the Heart of Policy Making*, subsection 3.1, *The Ethical Dimension in Science and the New Technologies*, the Science and Society Action Plan states:

"The rapid pace of scientific and technological progress can give rise to serious ethical questions of concern to all Europeans. These questions may also have potential implications for future generations. ...

"The level of awareness among researchers of the ethical dimension of their activities is rather uneven in Europe."

12. Concerning the use of experts, the Science and Society Action Plan noted:

"At worst, they are open to allegations that only 'tame' experts are selected, known to support pre-formed policy decisions."

The information shows that CERN's current safety review group for the LHC, the LSAG (the **LHC Safety Assessment Group**) is open to this impression. The Science and Society Action Plan went on:

"There needs to be a more systematic and open approach, at national and European level, to identify the best expertise at the right time. Thirdly, advice can appear remote if the public and stakeholders are excluded, and are unable or ill equipped to contribute to the debate and to challenge the experts and the advice they give. There is a need to open up the process by providing opportunities for the voicing of alternative views ('a competition of ideas'), for scrutiny and for constructive debate. Experience shows that when scientific networks link with national regulators, associate representatives of the various stakeholders, including civil society where appropriate, and operate with transparent procedures the conflict potential of certain issues is largely defused and acceptance of the ensuing regulation increases." [underlining added]

The explicit use of the above process would assist the assessment of the LHC risk situation.

13. I turn now to a further European Commission document, the White Paper on Governance, Work Area 1, *Broadening and Enriching the Public Debate on European Matters*, Report of the Working Group's "Democratizing Expertise and Establishing Scientific Reference Systems". Here one section refers to "Broadening and Integrating the Expertise used in Policy-Making", which reads in pertinent part:

"The objective is to deliver knowledge for decision making that is 'socially robust'. This implies a notion of expertise that embraces diverse forms of knowledge (plurality). Expertise should be multidisciplinary, multi-sectoral and should include input from academic experts, stakeholders, and civil society. Procedures must be established to review expertise beyond the

traditional peer community, including, for example, scrutiny by those possessing local or practical knowledge, or those with an understanding of ethical aspects." [underlining added for emphasis]

Again, the above shows that the CERN LSAG does not follow this blueprint.

14. I next turn to the European Commission document *Communication from the Commission on the Collection and Expertise by the Commission: Principles and Guidelines*, "Improving the Knowledge Base for Better Policies". In its Introduction this document states:

"As a condition for success, it is crucial that policy choices are based and updated on the best available knowledge. This requires access to the right expertise at the right time. ...

"Recent history – from BSE to GMOs - has shown that difficult policy decisions must sometimes be made on contentious issues in the face of significant uncertainty. Scientific expertise is then as much about stating what is unknown, or uncertain with differing degrees of probability, as about setting out commonly agreed and accepted views. The Commission might be confronted by a panoply of conflicting expert opinions, coming variously from within the academic world, from those with practical knowledge, and from those with direct stakes in the policy issue. These opinions may be based on quite different starting assumptions, and quite different objectives. They may also link to issues that go beyond what is commonly regarded as 'scientific'.

Furthermore, no matter what seems to be the 'right' decision for those involved in the advisory process, it is essential that interested parties and the public at large are themselves convinced that decisions are sound. Increasingly, then, the interplay between policy-makers, experts, interested parties and the public at large is a crucial part of policy-making, and attention has to be focused not just on policy outcome but also on the process followed."

Please note the above emphasis on process. The document went on:

"These issues were addressed by the Commission in its White Paper on European Governance, adopted in July 2001. In this, it was observed that:

'It is often unclear who is actually deciding - experts or those with political authority. At the same time, a better-informed public increasingly questions the content and independence of the expert advice that is given.

These issues become more acute whenever the Union is required to apply the *Precautionary Principle* and play its role in risk assessment and risk management.'

Please note the explicit reference to the *Precautionary Principle*. [underlining added for emphasis]

15. As the above shows, all the above awarenesses and provisions appear to be completely absent in the CERN process. On the face of it, then, where the assessment of the risk from the CERN LHC is concerned, there appear to be major deficits concerning process, and especially ethical process, requiring early redress.

16. I now provide some further details supporting the above synopsis. These details are in the form of a general account. There are two dimensions to the collider risk question: the *physics of the risk*; and the *appropriateness or otherwise of the process* being used to assess the physics of the risk.

17. The risk scenario is not a fringe fantasy. That potentially deadly particles might be produced has been proposed from theory by physicists, and entertained as potentially credible by eminent physicists (one of whom, Dr. Frank Wilczek, went on to win the Nobel Prize in physics). The risks from the particles have seriously been flagged and considered, including by two physicists who are highly eminent - the astronomer, Martin Rees, present President of the *Royal Society*, and the physicist Francesco Calogero (who is also active in the *Pugwash Conferences*, and who was its Director General when the Pugwash Organisation received the Nobel Prize).

18. I now provide further material concerning the notion that the prime foundational risk concerning the LHC concerns ethical process, - that the LHC project and its associated risk question has arrived at this late stage while being assessed only

by the protagonists for the collider that is the process of concern. In other words, the prime risk is the lack of an ethical governance institution for, and indeed, independent government regulation of, the LHC risk.

19. This view was also previously put forward for the US collider, Relativistic Heavy Ion Collider (RHIC) by the prominent (indeed regarded by many, according to the *Atlantic Monthly*, as a future US Supreme Court candidate) US jurist, the honorable Richard Posner. In his book *Catastrophe: Risk and Response in 2004*, he observed the lack of such process, and called for such by government regulation. This view was uncompromisingly supported by Kenneth Foster in his review of Posner's book in no less than *Science* magazine in 2005. Foster encapsulated the process issues and the underlying contributing mindset of some scientists in this section of the review, quoted as follows:

"Posner will infuriate many scientists whom, he writes, have an "attitude gap created by the different goals, and resulting different mindsets, of science on the one hand and public policy on the other. The scientist qua scientist wants to increase scientific knowledge, not make the world safer — especially from science. ...

The strangelet scenario is a case in point. Shortly before a new high-energy accelerator [RHIC] was to begin operation at Brookhaven National Laboratory, a physicist raised concerns that a high-energy collision might trigger a runaway reaction that would quickly transform Earth into a 100-meter lump of inert matter. The lab director took the ethically dubious step of appointing an evaluation panel of physicists, all of whom had professional interests in seeing the experiments go forward. Posner dismisses as *non sequiturs* the various public statements by physicists intended to reassure the public of the improbability of the strangelet scenario. Seeing few economic benefits and a likely small but in fact unknown probability of disaster, he argues that high-energy research should be supported by universities rather than the government and that it should be brought under a strict regulatory umbrella."

20. Evidence will now be provided that the present LHC risk assessment situation is essentially identical to that pertaining to the RHIC. CERN itself is currently re-addressing the potential catastrophic risks that the LHC might generate. The new safety review is being conducted by a body called LSAG (LHC **S**afety **A**ssessment **G**roup). In 2006, members of the group around Dr. Wagner made representations via third parties to CERN management concerning the new physics and process issues. Although possibly caused by other factors than their representations, early in 2007, according to a letter to Dr. Wagner jointly signed by CERN's Director General [Dr. Aymar] and Chief Scientific Officer [Dr. Engelen], CERN "mandated a group of experts, not themselves members of the LHC experimental collaborations, to assess safety aspects of LHC operation. This group is mandated to provide by the end of this year [2007] a written report, which will be made available to the scientific community and to the general public through the CERN web pages." It is to be noted that it is this LSAG Report which is currently overdue.

21. This CERN initiative is welcome, but it still leaves concerns. Let us leave aside the fundamental concern that the initiative is being run by the protagonist, not by an arms-length EU regulator. First, are the "group of experts" only physicists, and therefore at risk of some narrowness of view? An email from LSAG to a colleague suggested the answer was unfortunately yes. The email stated: "LSAG is a group of CERN physicists..." Secondly, the conclusion: "a written report, which will be made available to the scientific community and to the general public through the CERN web pages" seems to presume all will be found to be well. What if the report found risks? Would not CERN wish to consider this, and what to do about it? And so should not

what would be posted on the website be both the report, and CERN management's response to it?

22. In this precise connection the above LSAG email stated: (LSAG is) "appointed by our management to review the developments in this area, and to formulate the scientific findings in a language comprehensible by the general public." This seems to assume that they will always find no risk, and it will always be simply a matter of reassuring the public in ever clearer language. That has the flavour of advocacy. But what if they do find a risk?

22. With this background, one can conclude that the current CERN LSAG process displays at least the following governance issues:

- (i) gaps in risk assessment
- (ii) unethical structuring of assessment teams
- (iii) lack of third party involvement in and audit of (i) and (ii) and, ultimately,
- (iv) lack of government regulation of potential of LHC to generate catastrophic risk

23. As this account will outline, considerable attention has been given this issue. But the attention has been only by the scientific community and the media. Strangely, no general risk assessment or ethics professionals [other than plaintiffs and their affiants herein] have become involved, and nobody - including no government body - with official risk assessment as its prime concern – as opposed to science or physics as its prime concern – has been involved.

24. That this LHC activity could start up as is currently planned without the close supervision of such an official risk assessment agency is, in my opinion, the prime risk of the range of risks involved concerning the LHC.

25. How has this matter stayed under the radar in this way? To me it could be because (in a nutshell):

- The activity is from sober, high-status, government-supported, Nobel-Prize-linked, prestige "big science", and matters in such an area would be assumed to be "in order";
- It involves tiny particles, and tiny things, in our "gut reaction" do not seem threatening;
- There are no precedents for this potential risk.

26. All these reasons, of course, are reasons to now give the risk the properly constituted, disinterested, arms-length scrutiny it deserves. I have been in contact with Professor Bill Freudenburg, *University of California*, on this matter. He wrote a paper which the peak journal *Science* rates as one of its Science Classics, *Perceived Risk, Real Risk: Social Science and the Art of Probabilistic Risk Assessment*, and to outline the situation I use his conceptual framework.

I also quote examples of failure to appreciate risk from the EU Environmental Assessment Agency's report 22: *Late Lessons from Early Warnings: the Precautionary Principle 1896–2000* and compare these examples with the collider situation. In all this you will discern that there are sensitivities, and things will, only humanly, be said, especially by those involved in the activity, such as "Too much has been invested, and it is too late to stop now."

27. But pressing on regardless is, of course, in and of itself a prime warning sign. This was at the heart of the space shuttle disaster, about which Dr. Richard Feynman wrote in the official *Rogers Commission Report* into the Challenger Crash:

"For a successful technology, reality must take precedence over public relations, for Nature cannot be fooled." [underlining added for emphasis]

28. I now turn to listing key issues as I see them against the content of the Freudenburg and EEA studies mentioned above. The collider problem arises because the LHC – admittedly in a small space and only for brief moments – can produce energy levels not previously seen in nature. Hence the LHC may also produce particles not previously seen, or not currently seen very often. At least two types of these particles, which can exist based on theory, could each, in their different ways, once produced, even if only one particle is produced, attract other particles to them in a chain reaction. This could continue until the Earth was destroyed.

29. As I outline below, several commentators have concerns, and on-going current concerns, both with this risk scenario itself, as well as how it has been handled by decision makers in the particle physics community. Such commentators include two who are highly eminent, the astronomer, Martin Rees, present President of the *Royal Society*, and the physicist Francesco Calogero (who is also active in the *Pugwash Conferences*, and was its Director General when Dr. Pugwash received the Nobel Prize).

30. With this background I will now list the specific planks of the situation which have lead to our current concern. As mentioned above, I use as the analysis and summarizing framework Table 1, Freudenburg's "typical 'warning signs' that would

cause a prudent board of trustees to question the recommendations of their technical experts”.

31. Table 1 lists the Freudenburg warning signs, and by itemizing and referencing major examples, shows that a case can be made that all seven warning signs are triggered:

Table 1: Freudenburg's "typical 'warning signs' that would cause a prudent board of trustees to question the recommendations of their technical experts" and matched with collider situation.

<u>Warning sign</u>	<u>Warning sign triggered? (Y/N)</u>	<u>Rationale</u>

Characteristics of Specialists

Specialists have direct interest in outcomes	Y	Study of the author affiliations of both the prior safety studies (for RHIC [1]and LHC [2]) shows all authors in each study had such an interest
Specialists' past recommendations were wrong ("...if a given expert has been wide of the mark or has caused problems and difficulties in the past.")	Y	First, we were told about black hole production from the RHIC collider (Wilczek, <i>Scientific American</i> July, 1999 [3]): "The idea that mini black holes will be formed... The energy densities and volumes that will be produced at RHIC are nowhere near large enough to produce (the) strong gravitational fields (required)." Then in 2005 Nastase of the high-energy physics theory group at Brown University, wrote [4]: "We argue that the fireball observed at RHIC is (the analog of) a dual black hole."


		Turning to the LHC, we are told, by CERN itself [5]:" the 14 TeV centre-of-mass energy of the Large Hadron Collider (LHC) could allow it to become a black-hole factory with a production rate as high as about one per second."
Specialists' activities and recommendations have broader implications	Y	There are implications for the reputation of science in general (if there is "only" a local disaster such that people are around afterwards to do a post-mortem)
Other experts indicate there may be reason for worry ("...arises when another expert warns the policy-maker that something seems to be seriously amiss)	Y	Commentators with standing – Calogero [6], Rees [7], and Kent [8] - have observed this. Initial collider (RHIC) safety assessment was not done until after public pressure; membership of RHIC panel noted to be biased; no action in years since by CERN to rectify its own similar bias.
Characteristics of Situations		
Those that contain a large element of the unknown	Y	For example from Cho, <i>Science</i> , March 7, 2007 [9]: "We are so used to discussing the new territory that we are going to enter that sometimes we think that we know what we are going to find," says Jos Engelen, chief scientist at CERN. "Well, we don't, and I think it will be much more exciting than we expect." But in such statements the goodness or badness and scale of the phenomena possible are not touched on. Why should all novelty necessarily be good and/or small-scale?
Those in which potential consequences of mistakes could be especially severe	Y	Destruction of Earth meets this criterion
Those in which errors have potential to be irreversible	Y	Destruction of Earth

32. The use of the Freudenburg criteria as above led to there being a total of 7 authoritative warning signs that an inadequate risk assessment process is being used for the LHC project . The earlier content in this affidavit specified over a dozen departures from current recommendations for an ethical process. Reference to a report of the European Environmental Agency *Late Lessons from Early Warnings* can be shown to add six more, leading to a large number of warning signs of inadequacies . The inadequacies can be summed up as involveing both the risk assessment methods and risk assessment team membership being used by CERN, as well as the lack of supervision by a properly constituted external risk assessment agency.

33. The authors of the *Late Lessons from Early Warnings* report note that adopting the lessons from the report "would at least increase the chances of anticipating costly impacts, and of minimizing the costs of unpleasant surprises." Given the worst-case scenario stakes of potentially "unpleasant surprises" and "costly impacts" risked by the LHC project for the small societally-crucial benefit being promised, it is hoped that this Court will issue the requested TRO so that a proper review process can be initiated, starting with the assessment and review of the belated LSAG report by plaintiffs and their associates.

34. WHEREFORE, it is respectfully requested that this Court issue the requested TRO so that I, my associates, and appropriate others may have the opportunity to review and assess the belated LSAG "safety review" prior to commencement of LHC operations.

DATED: March 14, 2008

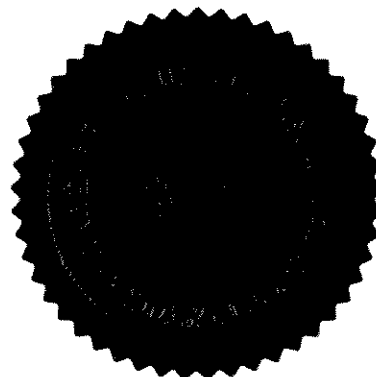

Mark Leggett

NOTARIZATION

Before me, the undersigned Notary, today appeared Mark Leggett, ^{PROVIDED} known to me to be the person whose name is subscribed to the foregoing instrument, who being by me first duly sworn on his oath, deposes and says the text of this affidavit on this 14TH day of March, 2008.

Notary Public, State of Queensland, Australia

Margaret Laurelle McNamara
Notary Public
Level 16, 240 Queen St
BRISBANE, QLD, 4000, AUSTRALIA
(Typed or Printed Name of Notary)



My commission expires: _____

[seal]

[Note: the Notary will sign and affix his/her notary seal, which should include the state where issued, and the expiration date.]

APPENDIX – References Cited or Used In Mark Leggett Affidavit Not Otherwise Identified in Text

- [1] Busza, W et al. "Review of Speculative 'Disaster Scenarios' at RHIC", www.arxiv.org/abs/hep-ph/9910333v1 [1999]
- [2] Blaizot JP et al. "Study of potentially dangerous events during heavy-ion collisions at the LHC : Report of the LHC Safety Study Group" CERN [2003]
- [3] Wilczek F, "Reply to Letter to the Editor, Black holes at Brookhaven?" *Scientific American* July, 1999 [1999]
- [4] Nastase H, "The RHIC Fireball as a Dual Black Hole", <http://arxiv.org/abs/hep-th/0501068> [2005]
- [5] Barrau, A and Grain J, "The Case for Mini Black Holes", CERN Courier 44 [2004] <http://cerncourier.com/main/article/44/9/22>
- [6] Calogero, F, "Might a Laboratory Experiment Destroy Planet Earth?" *Interdisciplinary Science Reviews* 25, 191-202 [2000]
- [7] Rees M, *Our Final Hour*, Basic Books, New York, [2003]
- [8] Kent A, "A Critical Look at Risk Assessments for Global Catastrophes", *Risk Anal.* 24:157-168 [2004].
- [9] Cho A, et al. "Large Hadron Collider: Physicists' Nightmare Scenario: The Higgs and Nothing Else", *Science* 315: 1657-1658 [2007]